CLAIMS

What is claimed is:

1   1.   An integrated circuit (IC) comprising:

2   interface circuitry to interface the IC to a burn-in system, the interface circuitry to

3   receive at least one temperature value from the burn-in system and to send at least one

4   temperature indication to the burn-in system;

5   a storage circuit coupled to the interface circuitry to store the at least one

6   temperature value; and

7   a thermal sense circuit coupled to the interface circuitry to provide the at least one

8   temperature indication.

1   2.   The IC recited in claim 1, wherein the at least one temperature value is a set-

2   point.

1   3.   The IC recited in claim 1, wherein the at least one temperature indication is

2   proportional to the junction temperature of the IC.

1   4.   An integrated circuit (IC) burn-in system comprising:

2   a computer system comprising a processor operating under the control of a

3   computer program; and

4   at least one IC comprising:

5   interface circuitry to interface the IC to the computer system; and

6   a thermal sense circuit, coupled to the interface circuitry, to provide a

7   temperature indication that is proportional to the junction temperature of the IC.

1   5.   The IC burn-in system recited in claim 4, wherein the computer system compares

2   the temperature indication with a temperature value determined by the computer

3   program;

4   wherein if the temperature indication substantially matches the temperature value,

5   the computer system bins the IC at that temperature value; and

6   wherein if the temperature indication is less than the temperature value, the

7   computer system decrements the temperature value and compares the temperature

8   indication with the decremented temperature value.

1   6.   The IC burn-in system recited in claim 4, wherein the IC further comprises:

2   logic circuitry coupled to the interface circuitry; and

3   wherein the logic circuitry is responsive to the temperature indication generated

4   by the thermal sense circuit;

5   wherein the logic circuit is also responsive to a temperature value generated by

6   the computer system as determined by the computer program;

7   wherein the logic circuitry compares the temperature indication with the

8   temperature value;

9   wherein if the temperature indication substantially matches the temperature value,

10   the logic circuitry generates a first indication to the computer system, and the computer

11   system bins the IC at that temperature value; and

12   wherein if the temperature indication is less than the temperature value, the logic

13   circuitry generates a second indication to the computer system, and the computer system

14   decrements the temperature value and compares the temperature indication with the

15   decremented temperature value.

1   7.   A burn-in system for an IC comprising a thermal sense circuit, the burn-in system

2   comprising:

3   a fixture to electrically couple to the IC;

4   a temperature-altering mechanism to alter the ambient temperature of the IC; and

5   a data processing system coupled to the fixture, the data processing system

6   executing a computer program, the computer program operating the burn-in system to

7   characterize the IC and comprising the operations of:

8   storing a temperature value for the IC;

9   controlling the temperature-altering mechanism to thermally stress the IC;

10   determining whether a temperature indication from the thermal sense circuit

11   substantially matches the temperature value;

12   if so, recording the temperature value; and

13   if not, changing the temperature value to a new temperature value and

14   determining whether the temperature indication matches the new temperature value.

1   8.   The burn-in system recited in claim 7, wherein the computer program operating

2   the burn-in system further comprises the operations of:

3   determining whether the temperature indication matches the new temperature

4   value;

5   if so, recording the new temperature value;

6   otherwise, repeatedly changing the temperature value and comparing the

7   temperature indication with the changed temperature value, until the temperature

8   indication matches the changed temperature value; and

9   recording the changed temperature value.

1   9.   The burn-in system recited in claim 7, wherein the temperature value is stored in

2   a storage circuit in the IC.

1   10.   The burn-in system recited in claim 7, wherein the temperature value is stored in

2   a storage element in the data processing system.

1   11.   A method of testing an integrated circuit (IC) comprising a plurality of electronic

2   devices, one of which is to provide a temperature indication, the method comprising:

3   storing a temperature value for the IC;

4   thermally stressing the IC;

5   the one electronic device providing a temperature indication;

6   determining whether the temperature indication matches the temperature value;

7   if so, recording the temperature value; and

8   if not, changing the temperature value to a new temperature value and
9   determining whether the temperature indication matches the new temperature value.

1   12.   The method recited in claim 11 and further comprising;
2   if the temperature indication matches the new temperature value, recording the
3   temperature value;
4   otherwise, repeatedly changing the temperature value and comparing the
5   temperature indication with the changed temperature value, until the temperature
6   indication matches the changed temperature value; and
7   recording the changed temperature value.

1   13.   The method recited in claim 11, wherein storing is performed by another one of
2   the plurality of electronic devices in the IC.

1   14.   The method recited in claim 11, wherein storing is performed by a burn-in system
2   coupled to the IC and comprising a stored-program digital computer.

1   15.   The method recited in claim 11, wherein the plurality of electronic devices
2   includes a logic circuit, and wherein determining is performed by the logic circuit.

1   16.   The method recited in claim 11, wherein determining is performed by a burn-in
2   system coupled to the IC and comprising a stored-program digital computer.

1   17.   A method of testing a plurality of integrated circuits (ICs), each comprising a
2   thermal sense circuit, the method comprising:
3   storing a temperature value for each IC;
4   thermally stressing the ICs;
5   each thermal sense circuit providing a temperature indication for its respective
6   IC;
7   determining whether the temperature indication matches the temperature value;

8   if so, recording the temperature value for the corresponding IC; and

9   if not, changing the temperature value to a new temperature value and

10   determining whether the temperature indication matches the new temperature value.

1   18.   The method recited in claim 17 and further comprising;

2   if the temperature indication matches the new temperature value, recording the

3   temperature value for the corresponding IC;

4   otherwise, repeatedly changing the temperature value and comparing the

5   temperature indication with the changed temperature value, until the temperature

6   indication matches the changed temperature value; and

7   recording the changed temperature value for the respective IC.

1   19.   The method recited in claim 17, wherein each IC comprises a storage circuit, and

2   wherein storing is performed by the storage circuit.

1   20.   The method recited in claim 17, wherein storing is performed by a burn-in system

2   coupled to the IC and comprising a stored-program digital computer.

1   21.   The method recited in claim 17, wherein each IC comprises a logic circuit, and

2   wherein determining is performed by the logic circuit.

1   22.   The method recited in claim 17, wherein determining is performed by a burn-in

2   system coupled to the IC and comprising a stored-program digital computer.

1   23.   A method of testing a plurality of electronic components, each comprising a

2   thermal sense circuit, the method comprising:

3   storing a temperature value for each electronic component;

4   thermally stressing the electronic components;

5   each thermal sense circuit providing a temperature indication for its respective

6   electronic component;

7   determining whether the temperature indication matches the temperature value;

8   if so, recording the temperature value for the corresponding electronic

9   component; and

10   if not, changing the temperature value to a new temperature value and

11   determining whether the temperature indication matches the new temperature value.

1   24.   The method recited in claim 23 and further comprising;

2   if the temperature indication matches the new temperature value, recording the

3   temperature value for the corresponding electronic component;

4   otherwise, repeatedly changing the temperature value and comparing the

5   temperature indication with the changed temperature value, until the temperature

6   indication matches the changed temperature value; and

7   recording the changed temperature value for the respective electronic component.

1   25.   The method recited in claim 23, wherein each electronic component comprises a

2   storage circuit, and wherein storing is performed by the storage circuit.

1   26.   The method recited in claim 23, wherein storing is performed by a burn-in system

2   coupled to the electronic component and comprising a stored-program digital computer.

1   27.   The method recited in claim 23, wherein each electronic component comprises a

2   logic circuit, and wherein determining is performed by the logic circuit.

1   28.   The method recited in claim 23, wherein determining is performed by a burn-in

2   system coupled to the electronic component and comprising a stored-program digital

3   computer.

1   29.   The method recited in claim 23, wherein the electronic components are integrated

2   circuits.

1   30.   A computer-readable medium containing computer instructions for instructing a

2   processor to perform a method of binning a plurality of ICs each having a thermal sense

3   circuit, the processor forming an element in a system comprising a temperature-altering

4   mechanism to thermally stress the ICs and a comparison mechanism, wherein the

5   instructions comprise:

6   storing a temperature value for each IC;

7   obtaining a temperature indication from the thermal sense circuit of each IC;

8   for each IC not yet binned, comparing the stored temperature value with the

9   temperature indication; and

10   if the temperature indication substantially matches the stored temperature value,

11   recording the temperature value;

12   otherwise, changing the temperature value to a new temperature value and

13   comparing the new temperature value with the temperature indication.

1   31.   The computer-readable medium recited in claim 30, wherein the instructions

2   further comprise:

3   if the temperature indication substantially matches the new temperature value,

4   recording the new temperature value;

5   otherwise, repeatedly changing the temperature value and comparing the

6   temperature indication with the changed temperature value, until the temperature

7   indication substantially matches the changed temperature value, and recording the

8   changed temperature value.

1   32.   The computer-readable medium recited in claim 30, wherein the instructions

2   further comprise:

3   determining an estimate of the burn-in time for each IC, using the particular

4   temperature value recorded for each IC.